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BC

A-1

Connexion between absorption and luminescence in concentrated dye solutions. V. L. Levschin (Acta Physicochim. U.R.S.S., 1935, 1, 685—712; cf. A., 1931, 1353).—Measurements on the absorption and fluorescence of rhodamine-G (extra) solutions are recorded. The absorption spectrum changes with increasing concn., due to association. The associated mols. are incapable of fluorescence and the intensity decreases. The conc. solutions on heating resemble dil. solutions. In Bu$^{\alpha}$OH solution changes in absorption spectrum occur only at high concn. This method of studying association is discussed. H. J. E.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

3

The phosphorescence of calcite. V. Levshin and M. Alentzev. *Compt. rend. acad. sci. U. R. S. S.* 2, 64 6(in French 56-7)(1935).—The phosphorescence of calcite, aragonite, marble and stalactite after excitation by light of 305 mμ was studied as to spectrum and intensity (I). I decreased with temp. in all cases and in the case of calcite and aragonite also decreased when the mineral was finely powdered. I decreased with time (t) according to the law: $I = At^{-\alpha}$, where A and α are consts. In all cases α was so large (1.43-2.65) that the phosphorescence became invisible to the eye in 10-20 sec. John E. Milbery

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

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BC

17-1

Correspondence between absorption and luminescence spectra of dilute solutions of dyes. IV. Effect of temperature and solvents. V. L. Levschin (Acta Physicochim. U.R.S.S., 1935, 2, 221—238; cf. A., 1935, 808).—Absorption and luminescence spectra of eosin *B* in H_2O, *iso*amyl alcohol, and $COMe_2$, and of erythrosin and rhodamine 6*G* in H_2O and $COMe_2$, have been investigated with respect to temp. and solvent. The symmetry of form of the two spectra is maintained in all cases. Change of solvent causes displacement of both absorption and luminescence spectra, the max. undergoing equal displacements. The direction of the displacement is not determined by the dielectric const. of the solvent. The area of the absorption spectrum is approx. the same for all solvents, although the luminescence efficiency, η, varies greatly. The variation of η with temp. is independent of dye concn. and of the properties of the solvent.

A. J. M.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

LEVSHIN ~~L. V.~~
V. L.

COMMON ELEMENTS

3

The luminescence of ZnSCu and ZnS.CdSCu α-phosphors and the structure of phosphorescence centers. V. L. Levshin and S. A. Fridman. *J. Phys. Chem. (U. S. S. R.)* 6, 1277-85(1935).—The extinction law of the spectra and the total light emitted by ZnSCu and ZnSCdSCu α-phosphors indicate that the centers of fluorescence are not complexes of many thousands of molecules but have a rather simple structure. The light emitted passes through a max., then through a min. and then increases very rapidly above 1200° as the temp. is increased. Addn. of NaCl and KCl gives a min. at about 2%, a max. at 10% and then again a sharp decrease. Up to 10% added CdS the quenching rate is decreased but above 10% it increases and above 20% again decreases owing to a deforming influence of Cd atoms on the structure of the fluorescence centers.

F. H. Rathmann

LEVSHIN, Vadim Leonidovich, 1896-

Phosphorescent materials Moskva, Izd-vo Akademii nauk SSSR, 1936. 134 p.
(Seriia nauchno-populiarnaia)

3

The investigation of the extinction of the luminescence of phosphorescent substances activated by means of organic activators. L. Vinokurov and V. Levshin. *Compt. rend. acad. sci. U. R. S. S.* [N. S.], 2, 130-6 (1936)(in French).—Uranin, eosin, erythrosin, esculin and naphthionic acid were investigated. The law of excitation for phosphorescent boric acid (I) (heated to 170°), and $Al_2(SO_4)_3 + 18H_2O$ (II) (heated to 125°) was found to be strictly exponential. In the whole interval of declining intensity, which covered a more than hundred-fold intensity ratio, the course of the process could be expressed very closely by the formula: $I = I_0e^{-t/\tau}$, where I_0 is initial intensity just after the cessation of the excitation, and τ (in sec.) the mean duration of the phosphorescence. The decrease is equally producible at both ends of the interval of the luminescent spectrum of uranin I at λ = 480-495 mμ and 580-620 mμ. When the concn. of the activator is very great (3×10^{-4} g./g.), the luminescence becomes visibly weaker and the excited state is of shorter duration. At the same time a change in the compn. of the emission spectrum is produced toward longer waves. Besides the phosphorescence, I and II also give a fluorescence whose spectrum is very like that of the phosphorescence. For concns. of uranin of 10^{-6} to 3×10^{-5} the av. ratio of fluorescence to phosphorescence was 2.0-3.0 for the above λ intervals. In the case of I the different activators gave decreasing intensities in the order of their solv. in H_2O. The luminescence of I and II is very much like that of solid solns. The authors believe that the decrease of τ with increasing concns. of the activator is to be considered as an effect independent of the extinction, e. g., as a diminution of the stability of the excited centers, caused by the exertion of the reciprocal influences between excited and unexcited mols. Four references. Karl Kammermeyer

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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SA

1532

2046. Decay of Phosphorescence and Mechanism of Emission. W. L. Lewschin. *Acta Physica Polonica*, 5, pp. 301–317, 1936. *In French.*—A monomolecular process of emission leads to an exponential law while a bimolecular process, implying the separation of an electron from a centre, leads to a hyperbolic law of the second degree, $I = a/(b+t)^2$. The recent researches of Wawilow and the author as well the results of Nichols and Merritt show that the decay of the uranyl salts is strictly exponential corresponding therefore to a monomolecular process of emission. Experiments are here described, as performed by the author and others, on the decay of ZnS phosphors and on the variation of intensity with excitation. In the later stages the decay follows a hyperbolic law of the second degree, indicating a bimolecular process (separation of electron). This should give rise to a linear relation between the exciting intensity squared and the resulting emission intensity. This result has been found. In the case of the phosphors, made by incorporating small amounts of organic substances in boric acid and in $Al_2(SO_4)_3 \cdot 18\ H_2O$, the decay is found to be exponential indicating a monomolecular process of emission in these cases. J. R.

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CA

3

Quenching in boron and aluminum phosphors. L. A. Vinokurov and V. L. Levshin. *J. Phys. Chem.* (U. S. S. R.) 8, 181-90(1936).—Data are given for B and Al phosphors with the activators uranin, eosin, erythrosin, esculin and naphthionic acid. The spectra of fluorescence and phosphorescence are very close, the relative outputs for ø-uranin phosphor being 3.0 in both cases over a 20-fold range of concn. The rate of quenching is the same for all degrees of excitation. Eosin is less active and erythrosin still less so. The same generalizations apply to Al phosphors. The results are discussed for possible theoretical interpretations.

F. H. Rathmann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

Ca

An investigation of the decay of phosphorescence in boric acid and aluminum sulfate phosphorescent substances. V. L. Levshin and L. A. Vinokurov. *Physik. Z. Sowjetunion* 10, 10–33(1936).—The decay of phosphorescence in a no. of phosphorescent substances prepd. from boric acid and $Al_2(SO_4)_3$ and activated by various org. dyes (uranin, eosin, erythrosin, esculin and naphthionic acid) were investigated, the decay of phosphorescence being observed visually by means of a photometer. The law governing the decay was found to be exponential. An increase in the concn. of the dye shortens both the mean life of the excited state and the initial intensity of phosphorescence. Besides phosphorescence, boric acid as well as $Al_2(SO_4)_3$ samples exhibit bright fluorescence. Although, owing to concn. quenching, the general intensity of the emitted light is reduced, the relative intensity of the instantaneous and long-duration luminescence remains const. The luminescence efficiency of phosphorescent compds. activated by the dyes of the fluorescein series varies in the same sequence as in the case of the liquid solns. of the resp. dyes. These expts. point to the common nature of the phosphorescence of boric acid phosphorescent substances and solid solns. and to a sharp distinction in the luminescence mechanism between boric acid and cryst. phosphorescent substances activated by admixts. of heavy metals. The effect of various quenching processes on the initial intensity of phosphorescence and on the efficiency of luminescence is theoretically discussed. It seems possible that the concn. quenching of boric acid phosphorescent samples is largely due to the formation of nonluminescent mols. of the activator at high concns.

Marie Farnsworth

√

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BC

A-1

Absorption and luminescence spectra of uranyl salts and their solutions. V. L. LEVSCHIN (Bull. Acad. Sci. U.R.S.S., 1937, Ser. Phys., 185—200). —The absorption spectra of cryst. $UO_2SO_4,3H_2O$, $K_2UO_2(SO_4)_2,2H_2O$, $UO_2(NO_3)_2,6H_2O$, $UO_2(OAc)_2,3H_2O$, and $K_4UO_2(CO_3)_3$ are similar in form, but the absorption max. are shifted to slightly different frequencies according to the anion present. The other cation in double salts has little influence on the spectra. The fluorescence and absorption spectra of the salts are complementary. Dissolution does not affect the position of the bands, but blurs the fine structure, as also does raising the temp.
J. S. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

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A53b

2127. Quantum Interpretation of the Mirror Symmetry of Absorption and Luminescence Spectra. W. Lewschin. *Acta Physicochimica*, 6, 2, pp. 213-[illegible], 1937. *In English.*—An outline is given of the process of fluorescence of complex molecules which are treated as anharmonic oscillators. The theory is based on five assumptions. The most essential and specific condition for the molecules exhibiting the spectrum symmetry is the condition which requires complete similarity of the upper and lower systems of the energy levels of a molecule. Moreover, the theory utilizes the conclusion, derived from experiments, regarding the equal probability of transitions between any vibration levels of two systems of levels corresponding to one electronic transition.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

An attempt at a quantum interpretation of the optical symmetry of absorption and luminescence spectra. V. L. Levshin. *J. Phys. Chem.* (U. S. S. R.) 9, 1 11(1937). Theoretical.

F. H. Rathmann

METALLURGICAL LITERATURE CLASSIFICATION

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BC

A-1

Mechanism of luminescence in liquids under ultrasonic treatment. V. L. LEVSCHIN and S. N. RSHEVKIN (Compt. rend. Acad. Sci. U.R.S.S., 1937, 16, 399—404).—The intensity of the luminescence of H_2O and aq. solutions under the action of ultrasonic vibration decreases with rising temp. and disappears at about 50°. Traces of most salts have little effect, but $NaHCO_3$ causes quenching, as does saturation with CO_2. This is interpreted as confirming that the luminescence is due to formation in the liquid of cavities filled with H_2O vapour, which is excited under the influence of p.d. produced when the liquid is disrupted or the cavities destroyed. The luminescence of hydrazide solutions increases with amplitude of vibration but disappears in very violent vibrations.

J. W. S.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

LEVSHIN, V.L.

BC

A-1

PROCESSES AND PROPERTIES INDEX

Luminescence of complex molecules. V. L. LEVSCHIN (Bull. Acad. Sci. U.R.S.S., 1938, Sér. Phys., 337—340).—The origin of the broad emission and absorption bands of complex mols. in solution, and the connexion between the variation of the spectra and quenching processes due to heating the solutions, were investigated in the case of $(UO_2)^{II}$ salts. There is a considerable difference in the spectra as the temp. is decreased to —180°. The spectrum of solid $(UO_2)^{II}$ salts consists of broad diffuse bands at room temp., but at —180° each band splits into several narrow ones. Two small bands of considerable intensity appear in the middle of each former broad band. The emission spectrum of $(UO_2)^{II}$ salts in various solvents has been investigated, and conclusions are drawn regarding the force of interaction between the mols. of solute and solvent. The luminescence yield of various $(UO_2)^{II}$ salts and the problem of temp. quenching have been studied, but although there is always an increase in the luminescence as the temp. falls, this is not uniform. A. J. M.

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A-1

BC

COMMON ELEMENTS

Phosphorescence mechanism of samarium phosphorescent substances studied by the decay of their luminescence. V. Levschin and E. Rickman (Compt. rend. Acad. Sci. U.R.S.S., 1938, 20, 445—448).—The decay of intensity of the yellow and red lines of a CaS–Sm phosphor has been measured at 3 temp. The law of decay was hyperbolic, the decay const. being practically independent of temp. The initial intensity of luminescence was $\propto$ the square of the intensity of the exciting light. Excitation of these phosphors is therefore accompanied by complete separation of the electron from the phosphorescent centres, as in phosphors activated by heavy metals. J. A. K.

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AUTHOR INDEX

CA

3

The possibility of interpreting phenomena of polarized luminescence by using a linear oscillator model. VII. V. L. Levshin. *J. Phys.* (U. S. S. R.) 1, 265-77 (1939) (in English); cf. *C. A.* 19, 3222.—Theoretical-mathematical. By use of a simple linear oscillator model and by taking into account the angular displacement of the dipole axis in the excited state and the dipole mutation caused by heat collisions, good agreement between calcd. and observed values of the polarization p is obtained for fluorescein and rhodamine B solns. F. H. R.

P. N. Lebedev Phys. Inst. of the AS USSR, Moscow

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

LEVSHIN, V. L.

"Decay of Luminescence in Certain Classes of Luminsecent Substances (Al_2O_3Cr, CdI_2MnCl_2, Zn_2SiO_4Mn)," Dok. AN 25, No. 2, 1939.

P. N. Lebedev Physical Inst. AS, Moscow

LEVSHIN, Vadim Leonidovich

"A Study of Decay of Certain Classes of Luminescent Substances," Iz. Ak. Nauk SSSR, Ser. Fiz. 4, No. 1, 1940.

P.N. Lebedev Physical Institute of the Academy of Sciences of the USSR, Moscow.

LEVSHIN, Vadim Leonidovich

"On a Number of Luminescent Substances Used to Increase the Efficiency and to Correct the Spectral Composition of Radiation of Mercury Lamps," Iz. Ak. Nauk SSSR, Ser. Fiz. 4, No. 1, 1940.

P. N. Lebedev Physical Institute of the Academy of Sciences of the USSR, Moscow.

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C A

The origin of radiation of long and short duration in phosphors with an organic activator. V. L. Levshin and V. N. Tugarinov. *Compt. rend. acad. sci. U.R.S.S.* 28, 115-19(1940)(in English).—If a given substance emits both fluorescent and phosphorescent radiation, then the study of the variation in intensity of both these lights as a function of the intensity of the incident exciting light may decide whether these radiations have identical "centers" or not. In the first case, I_{fl} and I_{ph} both tend toward const. limits independent of I_{in}, the intensity of the incident light. In the 2nd case I_{fl} is proportional to I_{in}, whereas I_{ph} tends toward a const. limit. Expts. on phosphors of boric acid activated by uranin showed that the radiating centers of short and long duration are different.

E. G. Trammer

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3

CA

Modern investigations of the mechanism of luminescence of semiconductors. V. L. Levshin. *Bull. acad. sci. U. R. S. S., Sér. phys.* 5, 610-21(in English, 821-2) (1941).—Review with 19 references. G. M. Kosolapoff

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

LEVSHIN, V.P.

CA

3

Luminescence of crystals. V. P. Levshin (Phys. Inst. Acad. of Sci.). *Bull. acad. sci. U.R.S.S., Sér. phys.* 9, 355-68(1945).—Two sep. mechanisms are necessary to describe the luminescence of crystals: (1) the luminescence originates in discrete centers (mols. or ions); (2) it is a specific crystal process. To the first group belongs the luminescence of org. (aromatic) compds., solid N_2, ions such as UO_2^{++}, Mn^{++}, Cr^{+++}, rare earth ions, cyanoplatinate ions. In crystal luminescence the emission centers are the ions of the activator; the energy is absorbed probably by the anions of the lattice, close to the activator ions. There can be several impurity levels below the conductivity band; they do not form a continuous band and their depth is influenced by the lattice. In some cases light is emitted only after heating to 500-600°; in other it takes place at −100°. The number of electrons localized on impurity levels is relatively small. The depth of these levels in alkaline earth phosphors is 0.8 to 2.5 e.v. The mechanism of phosphorescence is described in an energy-band diagram for luminescence of discrete centers, immediate recombination, and fluorescence in the base material. 47 references. S. Pakswer

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3

Q1

Phosphors sensitive to red light. V. V. Antonov-Romanovskii, V. L. Levschin, Z. L. Morgenstern, and Z. A. Trapeznikova. *Compt. rend. acad. sci. U.R.S.S.* 54, 19-22 (1946)(in English).—A graphic study of some properties of alk. earth sulfides with two activators, Sm and Ce, or Sm and Eu the emission spectrum varies according to the basic material. [CaS/Sm, Ce] emits in the orange-range; [SrS/Sm, Ce] emits in the blue range; with Eu as second activator the emission shifts to the red end of the spectrum with increased Sr content. M. M. Lutwak

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

LEWSCHIN W. L.

5A

A 53

535.371 1509

On the interaction of Zn and Mn emission in ZnS. Mn-phosphors. Effect of wavelength of exciting light. I. LEWSCHIN, W. L. *C.R. Acad. Sci. URSS*, 54 (No. 2) 127-9 (1946).—ZnS. Mn phosphors with one activator have 2 luminescence bands: the band of the introduced activator (yellow in the case of Mn); and the blue band of the surplus Zn. The influence of the wavelength of the exciting light upon the increase in intensities of these bands when the intensity of the exciting light is increased is studied, the excitation being by the Hg lines 366 and 312 mμ. When the excitation is increased, the blue band grows slowly at first and then rapidly; the yellow band tends to saturation. L. S. O.

10

3

Influence of manganese concentration and temperature on the radiation of zinc and manganese in zinc sulfide-manganese phosphors. V. L. Levshin. *Compt. rend. acad. sci. U.R.S.S.* 54, 215-18(1946)(in English). The interactions of the bands of surplus Zn (blue band) and Mn (yellow band) in ZnS.4-Mn phosphors were investigated to find the dependence on concn. and temp. of the intensity of luminescence. The intensity of luminescence is expressed in terms of the intensity of the exciting radiation. The radiation process is discussed in terms of the transfer of energy from absorption centers within the lattice to emitting centers. The Mn centers are less numerous but because of closer connection to absorbing centers are more susceptible to increases in intensity at the expense of the Zn. S. E. Whitcomb

Lebedev Phys. Inst., AS

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

CA

Advances in luminescence analysis. V. L. Levshin. *Trudy Komissii Anal. Khim.* 1, 128-52(1947).—Review with 51 references. M. Hosch

LEVSHIN, V.L., professor (Moscow).

Remarks on plans for the curriculum in physics in secondary schools. Fiz.v shkole 7 no.2:42-43 '47. (MLRA 6:11)
(Physics--Study and teaching)

LEVSHIN, V. L.

PA 58T97

USSR/Physics
Optics
Light

Oct 1947

"Thirty Years of Soviet Optics," Prof V. L. Levshin, Dr Phys Math Sci, 4 pp

"Nauka i Zhizn'" No 10

General historical account of 30 years of development in Soviet optics. Briefly discusses work in fields of nature of light and properties of elementary emissions; spectral study of structure of matter; optic studies of molecular states and actions of light; and applied optics, its practical utilization, and construction of optical instruments.

58T97

LEVSHIN, V. L.

PA 34T100

USSR/Physics — Mar 1947
Spectrographic Analysis
Chemistry - Uranyl Salts

"The Duration of Static Distribution in Excited Molecules of Uranyl Salts," V. L. Levshin, G. D. Sheremet'yev, 17 pp

"Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki" Vol XVII, No 3

The radiation spectrum of uranyl sulfate at different temperatures is studied. It is shown that a change in the temperature causes a change in the distribution of energy both in the entire spectrum as a whole and within the separate bands of radiation. It is shown

ID — 34T100

USSR/Physics (Contd) — Mar 1947

experimentally that the dark interval between moments of absorption and the beginning of radiation is either absent or has a duration of less than 3×10^{-6} seconds ($< 0.01 \tau$).

Phys. Inst. im. Lebedev

ID — 34T100

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U

4

Interaction of zinc and manganese activators in zinc sulfide-manganese phosphors. V. L. Levshin (P. N. Lebedev Phys. Inst., Acad. Sci. U.S.S.R., Moscow). *J. Exptl. Theoret. Phys.* (U.S.S.R.) 17, 675-88(in Rus- sian); *J. Phys.* (U.S.S.R.) 11, No. 5(1947); cf. *C.A.* 41, 3371c, 5799f.—Phosphors of pure ZnS and of ZnS + Mn $10^{-[illegible]}$, 10^{-3}, and 10^{-2} g./g. ZnS, prepd. by activation with $MnCl_2$ and heated at 900°, 30 min., free from Fe (certain within $10^{-[illegible]}$ g./g.), were investigated in excitation by λ_e = 366 and 312 mμ, in vinylite-alc. films about 0.03 mm. thick (phosphor 2 mg./sq. cm., vinylite 1.6 mg./sq. cm.), perfectly transparent to both the exciting and the emitted light. The exciting intensity I_0 is expressed relative to the highest I_0 = 1.0, corresponding to ~0.03 w./sq. cm. (in 366 mμ). With I_0 = 1, the Mn10^{-3} phosphor emits only the orange-yellow light of Mn (max. about 585 mμ), with I_0 0.01, mainly the blue color of Zn (max. about 455 mμ). At room temp., the blue emission of ZnS lasts about 3 sec.; introduction of Mn $10^{-[illegible]}$ g./g. shortens it to 0.1 sec.; in this phosphor, the luminescence of Mn consists of 2 proc- esses: one decaying in a few tenths of a sec. and another of the order of 10^{-3} sec. Increase of the Mn content cuts down the length of the longer luminescence. Excitation with λ_e <300 mμ destroys the ZnS phosphor rapidly; with Mn 10^{-3} this destructive process is retarded by 75%, i.e., Mn has a protective effect. With increasing I_0, the brightness B_b of the blue band of Zn (of the Mn 10^{-4} phosphor) increases, first slowly, then faster; in λ_e 366, B_b is lower throughout than with λ_e 312; in the same phosphor, the brightness B_y is much lower than B_b, tends to satn. with increasing I_0, and is 1/3 to 1/4 as great as in λ_e 312 than in 366 mμ. The steep growth of B_b begins at I_0 at which B_y has already attained satn. These facts point clearly to a competition between B_b and B_y; in the face of the very small absorption of the exciting light, this cannot be due to competitive absorption (a screening effect of Mn) but must be attributed to unequal distribu- tion of the energy between Zn and Mn (in favor of the lat- ter) after absorption. The case of satn. of B_y indicates that the no. of Zn centers must be many times greater than that of the Mn centers. Explanation of the different effects of λ_e 366 and 312 was sought in the direction of an assumption of discrete centers of excitation by each of the two. λ_e: if so, superposition of λ_e 312 on a phosphor already satd. with λ_e 366 should result in further increase of B_y. Expt. showed that B_y actually increases, in other words, the new λ_e actually does excite addnl. centers which could not be excited by the previously applied λ_e; how- ever, additivity is not complete: a large part of the 312 centers can be excited also by 366 but not more than 30% of the 366 centers can be excited by 312. Increasing Mn content decreases B_b: in pure ZnS, B_b increases linearly with I_0; with Mn 10^{-4}, while B_y is still hardly noticeable, B_b is considerably depressed; with Mn $10^{-[illegible]}$, B_b is de- pressed still further, B_y reaches satn.; with Mn 10^{-2}, B_b vanishes completely, B_y becomes about 20 times greater than in Mn 10^{-4} and increases steadily with I_0, without

METALLURGICAL LITERATURE CLASSIFICATION

Phys. Inst. im. Lebedev

CA

Alkaline earth phosphors, characterized by a high sensi-
tivity to infrared rays. V. L. Levshin, V. V. Antonov-
Romanovskii, Z. L. Morgenshtern, and Z. A. Trapezni-
kova. *Zhur. Eksptl. Teoret. Fiz.* 17, 949-63(1947).—
Absorption spectra of phosphors of CaS (33%) + SrS
(67%), without activator (I), with Sm (II), with Ce
(III), with Eu (IV), with Ce + Sm (V), and with Eu +
Sm (VI), show that Sm alone causes only a slight shift of
the long-wave edge of the absorption band of I to longer
waves; only at very high concns. of Sm, 0.01 g./g., does
one observe narrow absorption bands in the visible. In
contrast thereto, Ce gives rise to a new sharp band at 420
mμ, Eu to continuous absorption beginning at 580 mμ and
extending to shorter waves; V and VI give, resp., the
same absorption spectra as III and IV. Consequently,
in V and VI, it is Ce or Eu, resp., which is responsible
for the absorption. The luminescence spectrum of V has
max. at 500 and 550 mμ, that of VI at 625 mμ. Vari-
ation of the ratio Sr:Ca causes only shifts in the position
and height of the max., without changing the character of
the spectrum. Excitation with light absorbed by the
host crystal produces all 3 types of emission, namely
fluorescence, long-lived phosphorescence, and the flash on
irradiation with infrared. If V is excited by light ab-
sorbed by the activator (violet), it shows only fluorescence;
excitation of VI by the green light absorbed by Eu pro-
duces both fluorescence, phosphorescence, and the infra-
red-stimulated flash. Whereas Ce and Eu can be termed
main activators, Sm plays no significant role in either the
absorption leading to excitation or in emission; it decreases
the intensity of the phosphorescence, and, on the other
hand, it increases considerably the brightness of the flash.
The spectral curve of the yield η of the infrared-stimulated
flash of V and VI, defined by the ratio of the energy emitted
and the infrared energy absorbed, and detd. by a proce-
dure taking into account the scattering coeff. and the ef-
fective visual sensitivity of the eye, is detd. by the host
crystal and by Sm, and does not depend on the main ac-
tivators Ce and Eu; it may mean that the stimulating in-
frared is absorbed by Sm centers, then the energy trans-
mitted by resonance to electrons at local levels, and
emission is produced by recombination of the liberated
electrons with ionized centers Ce and Eu. The recom-
bination character of the flash is confirmed by the validity
of the hyperbolic decay law $I \sim t^{-n}$, and by the para-
bolic dependence of its initial brightness I_0 on the length
θ of the preliminary excitation, $I_0 = b\theta^2$, where θ is pro-
portional to the no. of ionized centers. The decay curves
of the flash emission of V, after 30 min., and 20 and 120
hrs. from the excitation, in log I (log t) coordinates, are
parallel and very close to each other. From these curves,
the energy stored in V decreases only by 40% on standing
at about 20° during the 1st 5 days, then the decrease be-
comes even slower. The curve of temp.-stimulated
emission of V, between 20 and 200°, has only 1 max.,
at about 70°, which indicates one single band of deep
trapping levels. In contrast to other infrared-sensitive
phosphors described in the literature, the total output
of the infrared stimulated emission of V is about 5-6
times greater than the temp. stimulated output. The
observed facts lead to the conclusion that the stimulating
infrared radiation is primarily absorbed, not by the trapped
electrons, but rather by Sm centers. From detns. of the

X

quantum yield of infrared stimulation, attaining 30 00%,
and over, the no. of repeated trappings of electrons, limited
by 1/q, cannot exceed a very few. The difference of the
total output in infrared and in thermal stimulation may
mean that, in the 1st case, electrons fall on the top of the
cond. zone, in the 2nd case, on its bottom. N. Thon

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

3

CA

Origin and composition of various forms of radiation in phosphors CaS.SrS + Ce,Sm,La. V. L. Levshin. *Doklady Akad. Nauk S.S.S.R.* 58, 770-82(1947); cf. *C.A.* 42, 8656c.—These phosphors largely produce radiation by recombination of electrons without preliminary localization, a secondary role is played by phosphorescence; fluorescence is quite unimportant. Intensity of excitation is about 1.5×10^{-4} w./sq. cm. and emission after excitation shows a very rapid rise, then a rapid decline after stoppage of excitation; phosphorescence is very feeble, lasting some 10 min. On excitation of 30 min. the light summation of the flash reaches 96% of max. magnitude, but the process is not complete even in 5 min. The decline of emission after stoppage of excitation is stepwise. The results are given graphically. G. M. Kosolanoff

LEVSHIN, V. L.

"Different Processes for Cutting Out (vysvechivaniye) Crystalophosphoruses," Iz. Ak. Nauk SSSR, Ser. fiz., No.3, 1948

CA

The emission processes of crystal phosphors. V. L. Levshin. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 12, 217-38(1948).—Lecture. The relatively simplest scheme adequate to account for the majority of the observations is one involving 2 activators a_1 and a_2 and 3 sets of trapping levels, b_1, b_2, and b_3, in the order of increasing depth. It accounts, among others, for the temp. dependence of the total light stored, $L = L_0e^{b/kT}$, and the temp. dependence of the brightness of phosphorescence, $I = 1/(1 + Ce^{-w/kT})$, verified for ZnS.S with $C = 10^6$, $w = 0.4$ e.v., and for ZnS.Cu with $C = 10^8$, $w = 1$ e.v. Outstanding facts of emission set off by long-wave irradiation are the proportionality of the brightness of the flash, I, and the infrared intensity, the $I = At^{-\alpha}$ law of the decay of the flash, with the value of α lower than in thermal emission and increasing with the total long-wave radiation amt. S, and the quadratic relation $I = aS^2$. For the kinetics of the luminescence process, the knowledge of the distribution of the electrons among the b levels, in addn. to the total no. of electrons trapped, is essential. This is illustrated, for the CaS.SrS.Ce, Sm, La phosphor, by the differences of I, at equal S, depending on the degree in excitation (in fractions of the max. excitation; a freshly excited phosphor is more sensitive to infrared than a phosphor with the same S but at some later stage of emission. Differences in the distribution of electrons on excitation at different temps. are further demonstrated by the steeper decay of CaS.Bi excited at 290°K. and allowed to emit at 346°K., as compared with the same phosphor excited at 346°K. With a given distribution, liberation of the electrons from the b levels depends on the manner in which the emission is set off, thermal, optical, or other. Interaction between activators consisting in a competition for the excitation energy transmitted from the crystal lattice is illustrated by the study of the brightnesses of Zn and of Mn luminescence in ZnS.Mn phosphors (Levshin, *C.A.* 42, 3266c). Interaction between activators may, on the other hand, result in a new kind of emission, or in quenching. The variously observed short-lived processes may be due either to direct excitation of the ions of the activator, or to direct recombination of electrons of the conduction zone without previous localization, or to the setting-off action of the exciting radiation itself, or, finally, to thermal passage of electrons from the shallowest trapping levels into the conduction zone. Differences of the compn. of the emission at the moment of the excitation are illustrated by 2 types; with CaS.SrS.Ce, Sm, La the initial emission is due to recombination of electrons either from the conduction zone or from the shallowest levels, whereas with ZnS.Mn it is mainly due to the latter. 24 references, covering all recent work from the author's school. N. Thon

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

C4

3

Nature of various forms of luminescence of phosphors with deep localization levels. V. L. Levshin. *J. Exptl. Theoret. Phys.* (U.S.S.R.) 18, 82-95(1948).--Various phenomena of luminescence, phosphorescence, and other types of radiations under activation from CaS-SrS-Ce, Sm, La phosphors are described. The elementary processes are discussed from which these phenomena originate and a correlation is established between the intensities in different stages of the luminescence. The chief results are: (1) In these phosphors particular deep-localized energy levels of luminescence exist, and much more flat levels of phosphorescence. (2) Both systems of levels are uniformly filled, i.e. the probability for the localization of electrons from the zone of cond. in both levels is the same. (3) The nature of the chief part of emission upon activation is understood as originating from recombination of electrons which either do not undergo introductory localizations, or are localized on the borders of the flat levels. (4) The changes of the probability for the recombination processes are established as functions of increasing exposure, and of filling of the levels of localization with electrons. W. Eitel

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

Effect of distribution of electrons by localization levels in the course of different luminescence processes in CaS-SrS-Ce, Sm, La phosphors. Number of repeated localizations of electrons. V. L. Levshin. *J. Exptl. Theoret. Phys.* (U.S.S.R.) 18, 140-63(1948).--Exptl. results with CaS-SrS-Ce, Sm, La phosphors, prove that a general equation for the kinetics of light emission of phosphors as a function of the accumulated integral light, independent of the character of the activation, or of the preceding extinction, cannot be established, because the integral light sum does not define the state of the phosphor. Essential for the course of all luminescence phenomena is the distribution of the electrons at levels of various depths on which they are to be localized. Discussion of the original electron distribution is indispensable for an understanding of all the exptl. details described. If these conditions are disregarded, only an incomplete expression for the kinetics of the radiation is obtained. Repeated electron localizations have only a relatively small effect and are not numerous. The kinetic theory of these emissions is much simplified by the conclusion from the exptl. data that the probabilities of localization at the levels of phosphorescence and of luminescence are equal, especially for phosphors with 2 levels of ionization, in so far as the kinetic problem thus comes nearer to that of phosphors with only one level of this kind. A schematically developed theory describes satisfactorily, but only in a qual. way, the processes of phosphorescence and luminescence in those sulfide phosphors. For the derivation of a more comprehensive theory addnl. exptl. data are indispensable, especially with regard to the detn. of the distribution function of the electrons at levels of their localization.

W. Kitel

Also: Zhur. Eks. i Teoret fiziki No. 2, 1948 p.149-63

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R00092971(

LEVSHIN, Vadim Leonidovich, 1896-

Fluorescent, luminiscence Moskva Pravda 1949. 38 p. (50-34215)

PA 36/49T95

USSR/Physics
Optics
Molecular Structures

Jan/Feb 49

"Influence of Molecular Structure of 9,10-Diaryl-Diamino Anthracenes on Their Optical Properties," N. D. Zhevandrov, V. L. Levshin, and K. K. Mozgova, Phys Inst imeni P. N. Lebedev, Acad Sci USSR, 18 pp

"Iz Ak Nauk SSSR, Ser Fiz" Vol XIII, No 1

Exhaustive investigation established following results: Introduction of substitutes into side chains of diaryl-diamino derivatives of anthracene had a marked influence on optical characteristics of their molecules, absorption and radiation

[redacted] 36/49T95

USSR/Physics (Contd)

Jan/Feb 49

spectra, luminescence yield, and duration of excited state. Nature of substitute had greatest influence, although position of substitute in side chain was also a factor. Duration of excited state in compounds studied varied from $8.6 \cdot 10^{-9}$ to $1.4 \cdot 10^{-9}$ sec. Luminescence yield in crystallic state was very high; in fact, it approached the maximum possible. Thus, concentrated extinguishing was almost lacking in the crystal state. Succeeded in comparing separate sections of spectra with different excitation conditions for the molecule.

[redacted] 36/49T95

LEVSHIN, V. L.

LEVSHIN, V. L.

IA 36/49T89

USSR/Physics
Phosphors
Luminescence

Jan/Feb 49

"The Flash Mechanism in SrS Phosphors as Effected by Rare-Earth Activators, and the Interactivity of Activators," V. V. Antonov-Romanskiy, V. L. Levshin, Z. L. Morgenshtern, Z. A. Trapeznikova, Phys Inst imeni P. N. Lebedev, Acad Sci USSR, 16 pp

"Iz Ak Nauk SSSR, Ser Fiz" Vol XIII, No 1

States that basic result of the study is that, in phosphors with two rare-earth activators, these activators situate themselves in systematic and

36/49T89

USSR/Physics (Contd) Jan/Feb 49

orderly manner, thus forming a complex center of luminescence due to certain chemical forces. Bases this conclusion on three independent series of investigations with single-activated and double-activated phosphors, i. e., studies of temperature radiation of excited phosphors, luminescence spectra, and spectral sensitivity of the flash.

36/49T89

CA

Effect of mechanical comminution on the optical properties of ZnS.Cu, ZnS.Mn, and ZnS.CdS.Mn phosphors. V. L. Levskin and I. V. Velts (Phys. Inst., Moscow State Univ.). *Zhur. Eksptl. Teoret. Fiz.* **20**, 411-20 (1950).—The changes brought about by comminution from an original av. vol. of the crystals v_0 (in cu.μ) to a smaller av. v are illustrated by the following data: $v_0 \to v$, v_0/v, and the shift of the longer-wave (activator) and of the shorter-wave (Zn) emission bands (in mμ) caused by the comminution: ZnS.Cu, 5609 → 338, 17, +8, and −10; ZnS.Mn, 87.5 → 14.6, 6, +10, and −8; ZnS(80%).CdS(20%).Mn (10^{-4} g./g.), 118 → 22, 5.4, +8, and −15. The brightness of both bands decreases as a result of the comminution. With ZnS.Cu and ZnS.Mn this decrease is approx. the same for both bands; in ZnS.CdS.Mn, the intensity of the Zn band decreases more rapidly than in ZnS.Mn or ZnS.Cu, and incomparably more rapidly than the Mn band, which appears to be much more persistent in ZnS.CdS.Mn than in ZnS.Mn. It is noteworthy that the maxima of the 2 bands are shifted in opposite directions. In ZnS.Cu and ZnS.Mn, the total yield of luminescence decreases linearly with decreasing mean vol. v of the crystals, and the same linearity, with different slopes, applies to the intensity of the yellow (Mn) emission band of ZnS(85%).CdS(15%).-Mn(10^{-4} g./g.) and of ZnS(80%).CdS(20%).Mn(10^{-4} g./g.). The steep fall of the brightness on comminution is conceivable only as a result of deep lattice distortions produced in the process of grinding. With ZnS.Cu, almost complete extinction of the luminescence was produced by comminution to grain size still higher than the original grain size of the strongly luminescent ZnS.Mn and ZnS.CdS.Mn phosphors. The form of the decay law of the luminescence, $I = At^{-\alpha}$, remains unaffected by the comminution. The exponent α either remains unchanged or, at most, decreases slightly with decreasing v. Thus, for ZnS.Cu, v = 5609, 338, 242 cu.μ, α = 0.90, const.; ZnS.Mn (10^{-4} g./g.), v = 87.5, 29.8, 14.6, 5.4, α = 1.24, 1.24, 1.00, 0.84; ZnS(80%).CdS(20%).Mn (10^{-4} g./g.), v = 118, 72, 54, 40, α = 1.11, 1.04, 1.04, 0.97. The fact that comminution, if anything, results only in a slowing-down of the decay, invalidates Lenard's assumption that longer luminescence corresponds to a greater vol. of the luminescence centers consisting of an activator atom surrounded by a large no. of host atoms. X-ray examn. confirmed Frey's (*C.A.* **44**, 3358a) finding that on comminution the original wurtzite structure of ZnS and ZnS.CdS goes over into the sphalerite structure, but, contrary to F.'s conclusion, that transition does not det. the change of luminescence. This follows from the observation that ZnS.Mn, which had the sphalerite structure from the outset and underwent no change of structure on comminution, and ZnS.Cu, which on grinding changed its structure from wurtzite to sphalerite, both showed the same decrease of the brightness of luminescence. The main factor responsible for the observed effects of the comminution is the distortion and deformation of the lattice, and this point of view is borne out by the observed increased diffuseness of x-ray diffraction lines in all comminuted samples.

N. Thon

LEVSHIN, V. L.

PHASE I Treasure Island Bibliographic Report

BOOK

Author: LEVSHIN, V.L.

Full Title: PHOTOLUMINESCENCE OF SOLID AND LIQUID SUBSTANCES

Transliterated Title: Fotoliuminestsentsiia zhidkikh i tverdykh veshchestv.

Publishing Data

Originating Agency: None.

Publishing House: State Publishing House of Technical-Theoretical Literature.

Date: 1951. No. pp.: 456 No. copies: 3,000

Editorial Staff

Editor: None. Technical Editor: None.

Editor-in-Chief: None. Appraiser: None.

Text Data

Coverage: The monograph is based on the work of Soviet scientists in the field of photoluminescence of liquids and solids. Laws of luminescence are presented for luminosity of aromatic, hydrocarbon, acridinic, and other simple compounds; complex aromatic and organic compounds; and polyions. Special data are, also, given on the use of luminosity in illumination, radio, X-Ray, chemical analysis, and other fields of science; also, practical application in industry and home appliances. The use of luminous paints and decorations is rapidly developing: signs, instrument parts, airfield runways, etc.

Purpose: The book, with the exception of a small part, is popularly written for students, teachers, and others engaged in the field of luminosity.

Facilities: None.

No. Russian References: 617.

Available: A.I.D., Library of Congress.

1. LEVSHIN, V. L. TARASOVA, T. M.

2. USSR (600)

4. Molecules

7. Effect of the molecular structure and of the temperature of medium upon luminescence and absorption of complex molecules. Izv AN SSSR Ser fiz No 5 1951.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

LEVSHIN, ~~L. V.~~
V. L.

Feb 51

USSR/Physics - Fluorescence

"Extinguishment of Fluorescent Solutions by Absorbing Substances, I," M. D. Galanin, L. V. Levshin, Phys Inst imeni Lebedev, Acad Sci USSR

"Zhur Eksper i Teoret Fiz" Vol XXI, No 2, pp 121-125

Examd variation of output and duration of fluorescence during extinguishment of fluorescence of 3-aminophthalamide soln and of some other substances by nonfluorescent dyes and by dyed inorg extinguisher ($CrCl_3$).

180T95

C.A

The emission of zinc sulfide phosphors. L. A. Vinokurov, V. L. Levshin, and E. G. Baranova (P.N. Lebedev Phys. Inst. Acad. Sci. U.S.S.R., Moscow). *Zhur. Eksptl. Teoret. Fiz.* 21, 236-51(1951).—Three types of fluorescence were sepd. with the aid of a rotating-disk phosphoroscope: (*a*) the "instantaneous" process, of $< 10^{-6}$ sec., not resolvable by the phosphoroscope, (*b*) the short-lived process, of the order of 10^{-5} sec., and (*c*) the long-lived emission. The phosphors investigated were ZnS-Mn (I), ZnS-Cu (II), and ZnS-Ag (III), all with excess Zn, i.e. actually with 2 activators, and emitting both the Zn band and the band of the 2nd activator. The decay of the short-lived process (*b*) is approx., but not actually, exponential with the following mean values of τ in excitation with 312, 366, and 436 mμ. for the stated concns. of the activator: I (1×10^{-4} g./g.) 4.7×10^{-5}, 2.2×10^{-5}, 2.0×10^{-5} sec.; (1×10^{-3} g./g.) 1.6×10^{-5}, —, 1.6×10^{-5}; (5×10^{-3} g./g.) —, 6.3×10^{-5}, —; II (1×10^{-4}) 6×10^{-6}, —, 1.25×10^{-5}; (2×10^{-4}) 3.2×10^{-5}, 5.4×10^{-5}; (5×10^{-4}) 0.4×10^{-5}, 1.6×10^{-5}, 3.2×10^{-5}, 5.3×10^{-5}; III (0) 1.05×10^{-5}, 1.8×10^{-5}, (1×10^{-4}) 1.7×10^{-5}, 3.2×10^{-5}; (1×10^{-4}) 1.1×10^{-5}, 1.5×10^{-5}, —; (2×10^{-4}) 1.1×10^{-5}, 1.9×10^{-5}, —. There is no simple relation between τ and the activator concn.; with the exciting wave length increasing from 312 to 436 mμ, τ decreases, roughly, by 1/3. The emission of the Zn band is depressed, and its τ shortened by the presence of the 2nd activator. Under conditions of weak excitation K, i.e. very far below the excitation corresponding to satn., the variation of the total energies S emitted in processes (*b*) and (*c*), with the log of the concn. of the activator, varies with the phosphor and with the exciting wave length; for process (*a*), S is always very low. For the orange band of I, in all 3 exciting wave lengths, $S_{(c)}$ is much greater than $S_{(b)}$ at low concns. and falls with increasing concn. so that at higher concns. $S_{(b)} > S_{(c)}$. For the green band of II, this holds only in excitation in 312 mμ, whereas in 366 and 436 mμ $S_{(c)}$ is $> S_{(b)}$ throughout, and the same applies to the blue band of III in both 312 and 366 mμ; the variation of both S with the concn. is slight. On the whole, excitation with 312 mμ gives lower $S_{(c)}$ and relatively greater $S_{(b)}$, whereas excitation with 366 mμ gives a reverse effect. The kinetics of the decay of emission (*c*) can be described by $I = A(a + t)^{-\alpha}$, which, at the initial stage ($t = 0$) goes over into $I_0 = Aa^{-\alpha}$, and, at late stages ($t \gg a$), into the usually adopted law $I = At^{-\alpha}$. The stage, θ, at which the latter simple law becomes applicable is reached the later, the weaker is the excitation E. This is shown by the treatment of data of Yastrebov on the decay of CaS-Bi at 52°, giving, for $E = 28$ (arbitrary units) $a = 1.14$, $\alpha = 1.73$, $A = 870$, $\theta = 14.5$; for $E = 7$, 1.16, 3.24, 754, 25.6; for $E = 1$, 1.18, 6.4, 436, 57.6; θ is approx. proportional to a, which thus characterizes the extent of the initial "slow decay." The simple $At^{-\alpha}$ law (i.e. $a = 0$) applies (in excitation with 436 mμ, at 20°) to thin layers of II with $1 \times 10^{-4} - 5 \times 10^{-4}$ g. Cu/g., but thick layers of the same phosphor show, in the coördinates (log I, log t), an initial curvature corresponding to $a = 0.11$, 0.42, and 1.72 at Cu $= 1 \times 10^{-4}$, 5×10^{-4}, and 5×10^{-4}, resp., and θ = 1.9, 2.5, and 21.8, resp. A qualitatively similar behavior is

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found in excitation with 366 and 312 mμ. This particular-
ity of thick layers is mainly due to reabsorption of the light
emitted from the deeper portions. In layers 0.07 mm
thick, the Zn band shows, between −180° and +20°, an in-
crease of a from about 1 to > 2, and a decrease of a. For the
Cu band of II, at 20°, a decreases with the exciting wave
length decreasing from 366 to 312 mμ, decreases with E de-
creasing from 1 to 0.016, decreases slightly with increasing
concn. of Cu, and remains practically unchanged on lowering
the temp. to −180°; a increases with decreasing E. For
the Mn band in I, at 20°, in excitation with 312, 366, and
436 mμ, a = 1.00, 1.25, and 1.70, resp., and scarcely varies
with the temp. between 20° and −180°. If the intensity of
the phosphorescence, I, at any stage is expressed as a func-
tion of the amt. of light stored, S (rather than as a function
of time), the relationship is empirically of the form I =
BS^n, where $B = B'd$, with d = thickness. This relation
can be linked with the decay law $I = A(a + t)^{-a}$, as, in the
absence of quenching, $I = -dS/dt$, and hence B =
$A^{1/(1-a)}(1-a)^{-1/(1-a)}$ and $n = a/(a-1)$; however, for
most phosphors, $I \neq -dS/dt$, and the BS^n law is not to be re-
lated to the kinetic law in terms of t. For II (5×10^{-6} g.
Cu/g.), in 366 mμ, n = 3.5, and 10^4B = 3.8, 2.4, 2.00,
1.55, at E = 1, 3.8, 15, 60, resp. For III (2×10^{-4} g.
Ag/g.), in 366 mμ, n = 3, and 10^4B = 4.26, 5.25, 11.2,
34.6, at E = 64, 16, 4, 1, resp. The variation of B with E
is due to the fact that equal S corresponds to an early stage
of the emission in the case of strong E, but to a late stage in
weak E; it means that at equal no. of excited electrons, re-
combination is faster at the early stages of a weakly excited
phosphor than at the late stages of a strongly excited phos-
phor. Comparison of B in excitation with 312 and 366
mμ shows that the stability of systems excited by light ab-
sorbed in the fundamental band 312 mμ is lower than that of
systems excited in the region of absorption of the activator.
N. Thon

183T84

LEVSHIN, V. L.

USSR/Physics - Luminescence, Crystals Mar 51

"Glowing of Activated Crystals," V. L. Levshin

"Uspekh Fiz Nauk" Vol XLIII, No 3, pp 426-484

Surveys spontaneous, forced and recombination luminescence of crystals, absorption and emission spectra of crystallophosphors, and effect of temp on their luminescence and extinguishment.

183T84

LEVSHIN, V. L.

Photoluminescence of Liquids and Solids. Glavpoligrafizdat, Main Polygraphic Publishing House, 456 pp, 1952.

LEVSHIN, V.L.

Scientific and pedagogical activity of S.I.Vavilov. Vest.Mosk.un. 8 no.5: 3-15 My '53. (MLRA 6:8)

1. Kafedra optiki. (Vavilov, Sergei Ivanovich, 1891-1951)

LEVSHIN, V. L.

The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-40, 20 Feb - 3 Apr. 1954)

Name	Title of Work	Nominated by
Levshin, V. L.	"Photoluminescence of Liquid and Solid Substances"	Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow State University imeni M. V. Lomonosov

SO: W-30604, 7 July 1954

LEVSHIN, L. V.

Chemistry of Solutions

Dissertation: "Effect of Concentration on the Optical Properties of Solutions of Acridine and Its Derivatives." Cand Phys-Math Sci, Moscow Order of Lenin State U imeni M. V. Lomonosov, 17 Mar 54) (Vechernyaya Moskva, Moscow, 4 Mar 54)

SO: SUM 213, 20 Sept 1954

VAVILOV, S.I.; LEVSHIN, V.L., redaktor; PANKRATOV, A.V., redaktor; AUZAN, N.Pl, tekhnicheskiy redaktor

[Collected works] Sobranie sochinenii. Moskva, Izd-vo Akad. nauk SSSR. Vol. 1 [Works on physics, 1914-1936] Raboty po fizike, 1914-1936. 1954. 450 p. (MIRA 8:5)
(Physics)

LEVSHIN, V. L., Prof.

"The Effect of Physico-Chemical Factors on the Luminescence of Complex Molecules" a paper presented at the Conference on Molecular Luminescence and Luminescent Analysis, MINSK from 20 to 25 June 1955.

LEVSHIN, V.L., Professor, doktor fiziko matematicheskikh nauk.

Luminescence of molecules and crystals. Nauka i zhizn' 22 no.5:17-20 My '55 (MLRA 8:6)

1. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Luminescence)

LEVSHIN, V.L., doktor fiziko-matematicheskikh nauk.

Fluorescent lighting and ways of introducing it. Vest. AN SSSR 25 no.10:54-58 O '55. (MIRA 9:1)

(Lighting)

LEVSHIN, L.V.

USSR

535.372

6038. Effect of concentration on the optical properties of solutions of 3, 6-diaminoacridine. L. V. Levshin. Zh. éksper. teor. Fiz., 28, No. 2, 201-12 (1955) In Russian.

Changes with concentration in ethyl alcohol of the absorption, polarization and luminescence spectra, the luminescence intensity and the mean lifetime of the excited state are shown to be explicable by dimerization of the compound. The energy of activation of this must be high, since a change from 20 to 96°C scarcely affects the intensity of the peaks in the absorption spectrum of the dimer.

R. C. MURRAY

Levshin, V.L.

USSR/Optics - Physical Optics

K-5

Abs Jour : Referat Zhur - Fizika, No 5, 1957, 12947

Author : Levshin, V.L., Laktionov, A.G.

Inst : Physics Institute, Academy of Sciences, USSR, Moscow State University USSR

Title : Absorption of Complex Molecules, Which are in a Metastable State.

Orig Pub : Dokl. AN SSSR, 1955, 103, No 1, 61-64

Abstract : Measurements were made of the absorption spectra of matastable (triplet) molecules of fluorescein in boric acid, and also of esculine, roduline orange, acrydine yellow, and rivanol in sugar drops. The spectra were measured on a recording spectra photometer GOI, and with the aid of a UM-2 monochromator, with illumination by unmodulated light (λ= 436 millimicrons). The investigated spectra are

Card 1/2

LEVSHIN, Vadim Leonidovich; SKANAVI, G.I., doktor fiziko-matematicheskikh nauk, otvetstvennyy redaktor; GRINGAUZ, V.A., redaktor izdatel'stva; PAVLOVSKIY, A.A., tekhnicheskiy redaktor

[Luminescence and its technical uses] Liuminestsentsiia i ee tekhnicheskie primeneniia. Moskva, Izd-vo Akademii nauk SSSR, 1956. 44 p. (MLRA 10:2)

(Luminescence)

VAVILOV, S.I.; LEBEDEV, A.A., akademik; TOPCHIYEV, A.V., akademik; TERENIN, A.N., akademik; LANDSBERG, G.S., akademik; VUL, B.M.; KRAVETS, T.P. [deceased]; LEVSHIN, V.L.; FEOFILOV, P.P.; GALANIN, M.D.; KUZNETSOV, I.V.; VAVILOV, V.S.; GUROV, K.P., redaktor izdatel'stva; KISELEVA, A.A., tekhnicheskiy redaktor

[Collected works] Sobranie sochinenii. Moskva, Izd-vo Akademii nauk SSSR. Vol.4.[Experimental foundation of the theory of relativity. On "warm" and "cold" light. The eye and the sun. Popular scientific articles and reviews] Eksperimental'nye osnovaniia teorii otnositel'nosti, O "teplom" i "kholodnom" svete, Glaz i solntse, Nauchno-populiarnye i obzornye stat'i. 1956. 469 p. (MIRA 9:8)

1. Chlen-korrespondent AN SSSR (for Vul, Kravets)
(Physics)

LEVSHIN, V.L.

USSR / Optics K

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10379

Author : Levshin, V.L., Tunitskaya, V.F., Cherepneva, A .A.
Inst : Physics Institute, Academy of Sciences, USSR
Title : Origin of Localization Levels in ZnS-Cu and Co Phosphors.

Orig Pub: Optika i spektrokopiya, 1956, 1, No 2, 255-263

Abstract: An investigation was made of the thermal glow (TG) of the phosphors ZnS, ZnS-Cu, ZnS-Co and ZnS-(Cu, Co) (annealing in $H_2S N_2$ and air for 30 minutes). In ZnS, the azure glow (bands at approximately 460 millimicrons) occurs only in the presence of a flux ($CaCl_2$). The peak of TG at -130^o is due to the superstoichiometric zinc (for which favorable circumstances are produced by the chlorine), and the peak at -60^o is ascribed to the oxygen. The green glow is ascribed to traces of copper. In ZnS-Cu, in addition to the zinc and oxygen peaks, there appear three new peaks, barely noticeable at -5 and 0^o and a considerable one at $+20^o$. These are ascribed to copper and appear to be the cause of the longer

Card : 1/2

Levshin, V.L.

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USSR / Optics

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10302

Author : Levshin, V.L.
Inst : Not given
Title : Problems of Luminescence of Crystal Phosphors. (Conference in Tartu).

Orig Pub: Vestn. AN SSSR, 1956, No 9, 99-100

Abstract: Report on the Fifth All-Union Conference on Luminescence, held on 25-30 June 1956 in the city of Tartu.

Card : 1/1

LEVSHIN, V.L.

LEVSHIN, V.L.

Influence of association and other physical chemical factors on the luminescence and absorption of complex molecules in solution. Izv. AN SSSR Ser.Fiz. 20 no.4:397-409 Ap '56. (MIRA 10:1)

1. Fizicheskiy institut imeni P.N. Lebedeva Akademii nauk SSSR.
2. Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova.
(Luminescence)
(Fluorescence)

Levshin, V.L.

K

USSR / Optics

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10406

Author : Levshin, V.L., Baranova, E.S.
Inst : Physics Institute, Academy of Sciences, USSR, Moscow
Title : Nature of Concentration Effects in Solutions of Rhodamines.

Orig Pub: Izv. AN SSSR, ser. fiz., 1956, 20, No 4, 424-432

Abstract: Description of the results of investigations, that confirm the association character of the concentration effects in aqueous solutions of rhodamine solution 6G extra and 3B. The data on the effect of concentration and temperature on the absorption spectra and on the yield are refined. It is shown that the concentration phenomena are independent of electrolytic dissociation. The independence of the absorption in the ultraviolet region on the concentration is explained by the fact that the electrons, responsible for this absorption, do not participate in the formation of the associates. The concentration quenching and temperature

Card : 1/2

Levshin, V.L.

B-4

USSR/ Physical Chemistry - Molecule. Chemical Bond

Abs Jour : Referat Zhur - Khimiya, No 3, 1957, 7193

Author : Levshin, ~~V.L.~~
Inst : Academy of Sciences USSR
Title : Closing Address at the Fourth Conference on Luminescence

Orig Pub : Izv. AN SSSR, Physical Series, 1956, Vol 20, No 5, 608

Abstract : No abstract.

Card 1/1

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R00092971

LEVSHIN, V.L., doktor fiziko-matematicheskikh nauk.

Problems in the luminescence of crystal phosphors (conference in Tartu). Vest.AN SSSR 26 no.9:99-100 S '56. (MLRA 9:11)
(Phosphors)

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R00092971O

51-3-10/24

AUTHORS: Levshin, V.L. and Tunitskaya, V. F.

TITLE: Effect of the wavelength of the exciting light and of the nature of trapping levels of ZnS:Cu:Co phosphors on the filling of traps. (Vliyaniye dliny volny vozbuzhdayushchego sveta i prirody urovney zakhvata fosforov ZnS-Cu, Co na ikh zapolneniye).

PERIODICAL: "Optika i Spektroskopiya" (Optics and Spectroscopy), 1957, Vol.2, No.3, pp.350-354 (U.S.S.R.)

ABSTRACT: Four ZnS phosphors were studied:- I - ZnS:Zn heated in air (2 groups of trapping levels), II - ZnS: Cu (3 groups), III - ZnS:Cu:Co (3 groups and some deep levels) and IV - ZnS:Cu heated in H_2S (2 shallow groups). They were excited at -180 C with light of 312 mμ (absorption band of ZnS), 366 mμ (where ZnS absorption decreases) and 436 mμ (Cu activator absorption). The emission intensities were recorded on heating from -180 C to about +150 C. Maximum intensities occurred for 366 mμ excitation. The filling of the trapping increased with the duration of the excitation up to a certain saturation value. In ZnS:Cu (heated in H_2S) only the shallow levels are filled; in the phosphors II and III the deep levels are filled first and then the shallow ones. The temperature-intensity curves depend strongly on

Card 1/2

LEVSHIN, V.L.

51-3-9/14

AUTHORS: Levshin, V. L., Borodin, N. S. and Neronova, G. P.

TITLE: On Emission of Excited Phosphors ZnS-Mn. (O Svechenii nakhodyashchikhsya pod vozbuzhdeniyem fosforov ZnS-Mn.)

PERIODICAL: Optika i Spektroskopiya, 1957, Vol.III, Nr.3, pp.258-266. (USSR)

ABSTRACT: This paper was read at the Fifth All-Union Conference on Luminescence (Tartu, June 26, 1956). The authors studied change of emission intensity of Mn in ZnS-Mn phosphors, (0.001 g/g Mn, prepared at 850°C) at fixed temperatures from 20 to 170°C at various intensities of the exciting light. Emission intensities and spectra were measured also at fixed exciting intensities but at different temperatures. The phosphors were prepared in the laboratory of the Physics Institute of the Academy of Science of USSR. Thin layers of the substances (20 μ) were deposited on plates by evaporating from alcohol. The excitation was provided by a mercury lamp ПPK-2. Measurements were made at various wavelengths of excitation. Curves giving dependence of brightness of Mn emission, J, on the exciting

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51-3-9/14

On Emission of Excited Phosphors ZnS-Mn.

light intensity, I, are given in Fig.1. On excitation by 312 and 366 mμ wavelengths the emission intensity is given by Eq.1 J = aI/(I + b), where a and b are constants. Table 1 gives values of these constants a and b for curves of Fig.1 obtained at 150°C. Fig.2 gives temperature dependence of the constant a. In contrast to the curves for 312 and 366 mμ which show saturation at higher values of the exciting light intensity I, no such saturation was observed for excitation with 405 and 436 mμ (Fig.3). Fig.4 shows temperature dependence of the emission intensity J on excitation by various wavelengths. The two upper parts of Fig.4, obtained at 312 and 366 mμ respectively, show a strong maximum at about 80-110°C. The lower two parts of Fig.4 which represent excitation at 405 and 436 mμ exhibit very weak or practically no maxima. The separate curves shown in each part of Fig.4 represent various exciting light intensities. Table 2 gives the increase of emission on increase of temperature, relative to emission at 20°C for various 366 mμ exciting light intensities. At weak

Card 2/4

On Emission of Excited Phosphors ZnS-Mn.

excitations temperature quenching causes decrease of emission at higher temperatures. When the exciting light is strong temperature quenching is relatively weaker and emission at higher temperatures is up to three times the emission at 20°C. The curves of Fig.4 show also that excitation intensity determines the temperature of maximum emission. With increase of excitation intensity this maximum occurs at higher temperatures. The authors suggest a mechanism for prolonged emission by ZnS-Mn phosphors which takes into account electron motion in the conduction band and hole motion in the valence band. The various transitions are shown in Fig.5. The authors also studied emission spectra of ZnS-Mn phosphors which contained different amounts of Mn and were prepared at different temperatures (sphalerite modification prepared at 850°C shown in Fig.7 and wurtzite modification prepared at 1200°C shown in Fig.8). Table 3 gives the light sums of Mn and Zn emissions at various temperatures and activator concentrations. It follows from Table 3 that: (1) on increase of temperature from 18-100°C Zn emission disappears but is fully compensated by increase of Mn emission;

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51-3-9/14

On Emission of Excited Phosphors ZnS-Mn.

(2) treatment of the phosphor at a higher temperature on preparation tends to strengthen Mn emission; (3) increase of Mn concentration from 0.001 to 0.01 g/g causes a strong increase of Mn emission and total disappearance of Zn emission. Positions of Mn emission maxima in the sphalerite and wurtzite structures are the same: 595 mμ. Zn emission maximum in the sphalerite modification lies at 475 mμ and in the wurtzite modification at 450 m . The authors thank E. Ya. Arapova for preparation of phosphor samples. There are 8 figures, 3 tables and 8 references, 5 of which are Slavic.

Card 4/4

ASSOCIATION: Moscow State University imeni M. V. Lomonosov (Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova.)

SUBMITTED: January 21, 1957.

AVAILABLE: Library of Congress

Levshin, V. L.

LEVSHIN, V.L.

Contribution of Soviet Science to the study of luminescence. (MIRA 10:12)
Opt.i spektr. 3 no.5:417-433 N '57.
(Luminescence)

AUTHORS: Levshin, V. L., Panasyuk, Ye. I., Pakhomycheva, L. A. 75-6-12/23

TITLE: The Application of Radioactive Isotopes on the Investigation of the Volatilization of the Accelerators of Crystalline Phosphorous on Annealing (Primeneniye metoda mechenykh atomov dlya izucheniya uletuchivaniya aktivatorov kristallofosforov pri prokalivanii shikhty).

PERIODICAL: Zhurnal Analiticheskoy Khimii, 1957, Vol. 12, Nr 6, pp. 723-726 (USSR)

ABSTRACT: By the application of radioactive isotopes it was established, that on a baking of phosphors, the silver concentration in zinc sulphide and alkaline-earthy phosphors and the zinc concentration in zinc sulfide phosphors volatilizes from 5 to 10°/o. The volatilization depends on the basic substance. In earth-alkaline phosphors, the volatilization is not higher than 10°/o, in calcium oxide 1 to 2°/o, and in apatites up to 80°/o. The volatilization of the accelerators from the basic substance occurs in the first few minutes of baking. Antimony volatilizes already at low temperatures. Zn^{65}, Ag^{110} and Sb^{124} were used as radioactive isotopes.
There are 3 tables, and 9 references, 1 of which is Slavic.

ASSOCIATION: Physics Institute imeni P. N. Lebedev AN USSR (Fizicheskiy institut imeni P. N. Lebedeva AN SSSR, Moskva).

Card 1/2

75-6-12/23

The Application of Radioactive Isotopes on the Investigation of the Volatilization of the Accelerators of Crytsalline Phosphcreus on Annealing.

SUBMITTED: July 26, 1956.

AVAILABLE: Library of Congress.

1. Crystalline phosphor accelerators-Volatilization
2. Radioactive isotopes-Applications

Card 2/2

LEVSHIN, V.L.

Work of S.I. Vavilov in the field of optics. Trudy Inst.ist. est.i tekh. 17:7-43 '57. (MIRA 10:7)
(Vavilov, Sergei Ivanovich, 1891-1951) (Optics)

Levshin, V.L.

48-4-1/48

SUBJECT: USSR/Luminescence

AUTHOR: Levshin V.L.

TITLE: Introductory Speech (Vstupitel'noye slovo)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #4, pp 475-482 (USSR)

ABSTRACT: The 5th Conference on Luminescence deals with the luminescence of solid crystalline substances.

During the last years, new methods of obtaining very pure substances for producing phosphors possessing definite properties have been developed. The method of chromatography acquired a special significance.

It was discovered that the atmosphere of calcination has a considerable effect on phosphor properties. Methods were developed which make it possible to control rigorously the composition of calcination atmosphere.

A method of producing crystallophosphors by means of sublimation, especially used by F. Klement, was extensively applied.

Card 1/4

48-4-1/48

TITLE: Introductory Speech (Vstupitel'noye slovo)

Prof. M. Konstantinova applied the thermographic analysis methods to the studies of crystal-formation processes.

New methods of analyzing the content of phosphors, such as the marked atoms method, came into use. The method of polarographic analysis was applied to determination of activator concentrations.

A. Bundel' found that many metalloids, such as oxygen, selenium sulfur and tellurium, can be used as activators in phosphors of the sulfurous zinc type. He developed a method of introducing activators from the gaseous phase, which is applicable both for metals and metalloids. A conception was worked out, according to which the center of luminescence in crystallophosphors consists of the activator located in the lattice knots, and neighboring cationic and ionic knots are modified in the same way in order to compensate the charge of an alien activator.

Important results as to the structure and location of luminescent centers were obtained by P.Feofilov by means of studying polarization of luminescence radiation.

The method of thermal de-luminescence was proposed and developed by Soviet physicists.

Card 2/4

48-4-1/48

TITLE: Introductory Speech (Vstupitel'noye slovo)

Ch. Lushchik and I. Parfianovich considerably improved the theory which connects the temperatures of maximum luminescence with energetic depth of the levels of electron localization. In this way, the method of thermal de-luminescence furnished a convenient way for the determination of localization levels in various phosphors and their filling with electrons.

Another method used in studying crystallophosphors was by measuring their electric properties, in particular the changes of their dielectric constant.

N. Tolstoy developed devices for measuring the times of phosphorescence decay and flash of the order of 10^{-6} to 10^{-7} sec. With the aid of new devices it was possible to investigate not only luminescence but also photoconductivity. A. Bonch-Bruyevich constructed a very good fluorometer for studying luminescence lasting from 10^{-9} to 10^{-10} sec.

Several new types of tube luminophores were obtained. Some of them, as for instance double-activator calcium phosphate, correct the red portion in the emission spectrum of luminescent tubes. New phosphore, such as arsenates, germanates, etc, were devised for correcting the luminescence of super-high pressure tubes used for street illumination.

Card 3/4

TITLE: Introductory Speech (Vstupitel'noye slovo) 48-4-1/48

Compounds of permanent action with a quite new mode of activation were developed: radioactive beta-emitters were used.

Flash phosphors for dosage metering of hard radiation and radioactive substances were developed.
No references are cited.

INSTITUTION: Not indicated

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

Card 4/4

Levshin, V.L.

48-4-6/48

SUBJECT: USSR/Luminescence

AUTHORS: Levshin V.L., Borodin N.S. and Neronova G.P.

TITLE: On Luminescence of ZnS-Mn-Phosphors Being under Excitation (O svechenii nakhodyashchikhsya pod vozbuzhdeniyem ZnS-Mn-fosforov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #4, pp 499-501 (USSR)

ABSTRACT: Changes in the brightness of the manganese band of ZnS-Mn-phosphors with the rise of excitation intensity were investigated. Experiments were carried out with the following wavelengths of the exciting radiation: 312; 366; 405 and 436 mμ, and under the following temperatures: 20; 50; 110; 130 and 150°C.

Luminescence saturation was detected at excitation by 312 and 360 mμ wavelengths. The course of saturation curves is expressed by the formula:

$$J = \frac{aI}{I+b}$$

Card 1/3

48-4-6/48

TITLE: On Luminescence of ZnS-Mn-Phosphors Being under Excitation (O svechenii nakhodyashchikhsya pod vozbuzhdeniyem ZnS-Mn-fosforov)

where J is the brightness of phosphor luminescence, I is the intensity of exciting light, and a and b are constants.

At the excitation by the lines of 405 and 436 mμ the rise of luminescence brightness occurred almost proportionally to excitation intensity and only slight traces of saturation were observed at very high intensities.

The temperature rise increases sharply the luminescence in the manganese band. Beginning from 70°C the temperature quenching is detected.

Emission spectra of the sphalerite and wurtzite modifications of ZnS-Mn-phosphors with various manganese concentrations and at various temperatures were also investigated. It was found out that the wurtzite modification favors development of manganese luminescence. The blue zinc luminescence is observed only at low temperatures. The rise of temperature causes the transfer of zinc luminescence into manganese one.

Card 2/3

Levshin, V.L.

48-4-44/48

SUBJECT: USSR/Luminescence

AUTHORS: Levshin V.L., Panasyuk Ye.I. and Pakhomycheva L.A.

TITLE: Luminescent Substances of Permanent Action with Artificially Radioactive Beta-Isotopes (Svetyashchiyesya sostavy postoyannogo deystviya s iskustvenno-radioaktivnymi beta-izotopami)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #4, pp 612-618 (USSR).

ABSTRACT: The Physical Institute im. Lebedev has developed since 1950 luminescent substances of permanent action activated with various radioactive isotopes. After investigations of numerous phosphors it was established that the ZnS-Cu phosphor is most luminous at beta-excitation.

The following conclusions resulted from these investigations:

1. Sr^{90} isotope, and in some cases Cs^{137} isotope, are recommended for luminescent substances of permanent action:

2. Luminescent substances activated with Sr^{90} can have a service time of the order of 10 years and more;

Card 1/2

48-4-44/48

TITLE: Luminescent Substances of Permanent Action with Artificially Radioactive Beta-Isotopes (Svetyashchiyesya sostavy postoyannogo deystviya s iskustvenno-radioaktivnymi beta-izotopami)

3. The maximum brightness of green compounds with Sr^{90} can exceed the brightness of compounds used at present by 10 times and even more;

4. Luminescent compounds of various colors, luminous enough for practical applications, have been produced.

5. Organic and silicate glasses with addition of 1% of cerium dioxide are recommended as protective shields.

The article contains 8 graphs. The bibliography lists 1 reference, translation into Russian. The report was followed by a discussion.

INSTITUTION: Physical Institute im. Lebedev of the USSR Academy of Sciences

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress

Card 2/2

LEVSHIN V.L

48-5-28/56

SUBJECT: USSR/Luminescence

AUTHORS: Levshin V. L. and Tunitskaya V.F.

TITLE: Nature of Localization levels in ZnS-Cu, Co-Phosphors and Their Filling under Various Excitation Conditions (Priroda urovney lokalizatsii ZnS-Cu, Co-fosforov i ikh zapolneniye v raznykh usloviyakh vozbuzhdeniya)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #5, pp 695-696 (USSR)

ABSTRACT: The magnitude and distribution of the light-sum of ZnS-Cu, Co phosphors over the levels of various nature and depth, and their dependence on excitation time and wavelength of exciting light were investigated. It was established that:

1. The probability of filling one or another group of levels for a given wavelength of exciting light depends not only on the depth of the levels but also on their origin.

2. The wavelength of exciting light affects strongly the distribution of electrons over the levels of different depths.

3. No transitions of electrons from the shallow levels into deeper ones were observed during thermal de-luminescence, when

Card 1/2

48-5-28/56

TITLE: Nature of Localization levels in ZnS-Cu, Co-Phosphors and Their Filling under Various Excitation Conditions (Priroda urovney lokalizatsii ZnS-Cu, Co-fosforov i ikh zapolneniye v raznykh usloviyakh vozbuzhdeniya)

shallow levels were mainly filled but there were many unfilled deeper levels.

4. The radiation with longer wavelengths affects more those electrons which are in the shallow levels. Some part of optically liberated electrons are transferred thereby from the shallow levels to deeper ones.

The report was followed by a short discussion.

Two Russian references are cited.

INSTITUTION: Physical Institute im. Lebedev of the USSR Academy of Sciences.

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

Card 2/2

LEVSHIN V.L.

48-5-29/56

SUBJECT: USSR/Luminescence

AUTHORS: Levshin, V.L. and Ryzhikov, B.D.

TITLE: On the Formation of Localization Levels in ZnS-Mn-Phosphors (Ob obrazovanii urovney lokalizatsii ZnS-Mn-fosforov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #5, pp 696-698 (USSR)

ABSTRACT: Curves of thermal de-luminescence for the blue luminescence of the wurtzite modification of ZnS-Mn-phosphors make it possible to detect 4 systems of localization levels. Peak positions in the thermal de-luminescence curves for shallow levels depend on the concentration of activator, namely the peaks shift to lower temperatures with an increase of Mn concentration. The relative development of thermal de-luminescence bands depends considerably on Mn concentration. The deepest levels obtain maximum development at a Mn-concentration of $3x10^{-5}$ g/g.

Thermal de-luminescence curves for the orange luminescence reveal an additional maximum at 265°C. The relative development and position of thermal de-luminescence bands also greatly depend on the Mn-concentration.

Card 1/2

48-5-55/56

LEVSHIN, V-L.

SUBJECT: USSR/Luminescence

AUTHOR: Levshin V. L.

TITLE: Concluding Speech (Zaklyuchitel'noye slovo)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #5, pp 781-782 (USSR)

ABSTRACT: The speaker noted the creation of a new large investigation center in Tartu headed by F.D. Klement, Rector of the Tartu University, and Ch.B. Lushchik who in addition are conducting original scientific investigations in the Central-Asian University.
Considerable number of chemists participated in the 5th Conference on Luminescence.
A considerable progress in the development of luminophore industry was noted.
The memory of S.I. Vasilov who greatly contributed to the science of luminescence was honored by standing up of all participants of the conference.

Card 1/2

48-5-55/56

TITLE: Concluding Speech (Zaklyuchitel'noye slovo)

INSTITUTION: Not indicated

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

Card 2/2

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R00092971O(

LEVSHIN, V.L.

A.2

5(2) PHASE I BOOK EXPLOITATION SOV/1727

Akademiya nauk SSSR. Institut geokhimii i analiticheskoy khimii

Redkozemel'nyye elementy; polucheniye, analiz, primeneniye (Rare Earth Elements; Extraction, Analysis and Application) Moscow, Izd-vo AN SSSR, 1958. 331 p. 2,200 copies printed.

Resp. Ed.: D. I. Ryabchikov, Professor; Editorial Board: I. P. Alimarin, Corresponding Member, USSR Academy of Sciences, I. E. Zaozerskiy, Doctor of Chemical Sciences, R. V. Kuglyarov, Candidate of Technical Sciences, V. I. Kuznetsov, Doctor of Chemical Sciences, M. M. Senyavin, Candidate of Chemical Sciences, and Yu. S. Sklyarenko, Candidate of Chemical Sciences; Eds. of Publishing House: D. N. Trifonov and T. G. Levi; Tech. Ed.: S. G. Markovich.

PURPOSE: This book is intended for scientists, chemists, teachers and students of higher educational institutions, chemical and industrial engineers, and other persons concerned with the extraction, preparation, use, or study of rare earth elements.

COVERAGE: This collection contains reports presented at the June 1956 Conference on Rare Earth Elements at the Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy of the Academy of Sciences USSR. The articles treat chemical methods of separating rare earth mixtures, methods of processing rare earth ores, ion exchange chromatography, chemical analysis, and some industrial applications of rare earths. Aside from contributing authors, the editors mention the following Soviet scientists, who are studying rare earth elements, rare earth deposits, extraction methods, and the preparation of oxides and salts: Martynov, Mel'nikov, Khrushchev, Melikov, Pisarzhevskiy, Chernyak, Tanatar, Belousov, Zhukov and especially, N. A. Orlov, who first obtained the majority of rare earth elements in the pure state, separated many complex molecular compounds of these elements, and determined their specific properties. References are given at the end of each article.

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AVAILABLE: Library of Congress (QD172, M2A38)

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6-13-59

Card 11/11

(7)

51-4-3-12/30

AUTHORS: Levshin, V.L. and Ryzhikov, B.D.

TITLE: Formation and Action of Localization Levels in ZnS-Mn Phosphors (Ob obrazovanii i deystvii urovney lokalizatsii ZnS-Mn-fosforov.)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.3, pp.358-364 (USSR)

ABSTRACT: This paper was presented at the Fifth Conference on Luminescence on June 28, 1956. The local trapping levels in ZnS-Mn phosphors were studied by means of measurement of thermal stimulation curves. Measurements were made on two series of phosphors in which concentration of Mn was varied between 0 to 0.1 g/g. Phosphors were prepared in covered crucibles using NaCl flux. Thin phosphor layers (0.018 mm) were used for measurements. Excitation was sufficiently strong to make stored light-sums reach their maxima at a given temperature and wavelength of exciting light. Mercury lines were used for excitation. The phosphor was excited at -190°C and was then heated at a uniform rate of 20 deg/min. In phosphors with Mn concentrations from 0 to 0.001 g/g blue emission was observed. Orange emission was observed at Mn concentrations from

Card 1/4

51-4-3-12/30

Formation and Action of Localization Levels in ZnS-Mn Phosphors.

0.0002 to 0.03 g/g. Fig.1 shows thermal stimulation curves for ZnS-Mn phosphors with various amounts of Mn which were excited at - 193°C by the 365 mμ line. Fig.1a represents blue emission, Fig.1b - orange emission. Fig.2 gives change in thermal stimulation of ZnS-Mn on change of wavelength of the exciting light. Table 1 gives the positions of the maxima of thermal stimulation curves. For the blue emission there are three maxima: I, near - 100°C; II, near - 50°C; III, near - 30°C. For the orange emission there are four maxima: I, near - 100°C; II, near - 40°C; III, near - 20°C; IV, near - 5°C. Table 2 gives the positions of the thermal stimulation maxima of ZnS-Mn phosphors excited by various wavelengths. Table 3 gives the changes of light-sums of blue and orange afterglow on change of Mn concentration. Table 4 gives the relative intensities of the maxima of orange and blue emission and integral light-sums on excitation with various wavelengths. In Table 5 the relative intensities of the orange and blue maxima are given for ZnS-Mn phosphors with various concentrations of Mn.

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Formation and Action of Localization Levels in ZnS-Mn Phosphors.

Fig.3 gives the absorption spectra of ZnS-Mn phosphors with various concentrations of Mn. Comparison of the thermal stimulation curves of ZnS-Mn phosphors shows that the positions of the maxima II and III of blue emission are displaced towards lower temperatures compared with the corresponding positions of orange maxima. The results are interpreted as follows. On thermal liberation of electrons from local trapping levels the probability of excitation of Mn centres increases and probability of excitation of blue-emission centres decreases with increase of level depth. The total light-sum of the blue emission is not greatly affected by the wavelength of the exciting light, in contrast to the light-sum of the orange emission which depends strongly on the wavelength of excitation. For both the blue and orange emissions excited by 436 and 405 mμ lines the main thermal stimulation maxima are due to liberation of electrons from deep levels. At low concentrations of Mn (up to 0.0001 g/g) the absorption decreases and the blue-emission intensity increases with increase of Mn content. On further

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51-4-3-12/30

Formation and Action of Localization Levels in ZnS-Mn Phosphors.

increase of Mn concentration the blue emission weakens, the orange emission increases and a new system of deep levels near - 5°C is formed. Mn ions at low concentrations occupy positions around defects in the crystal lattice, but with increase of Mn concentration the activator ions replace Zn ions at lattice sites. There are 3 figures, 5 tables and 11 references, of which 7 are Soviet, 2 American, 1 Dutch and 1 German.

ASSOCIATION: Physics Institute imeni P.N. Lebedev, Academy of Sciences of the USSR; Moscow State University (Fizicheskiy institut im. P.N. Lebedeva AN SSSR; Moskovskiy gosudarstvennyy universitet.)

SUBMITTED: May 16, 1957.

1. Phosphors--Luminescence--Thermal effects

Card 4/4

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R00092971O(

SOV/30-58-7-4/49

AUTHOR: Levshin, V. L., Doctor of Physical and Mathematical Sciences

TITLE: New Trends in the Investigation of Luminescence and the Development of Its Applications (Novyye napravleniya v izuchenii lyuminestsentsii i razvitiye yeye primeneniy)

PERIODICAL: Vestnik Akademii nauk SSSR, 1958, Nr 7, pp. 26 - 31 (USSR)

ABSTRACT: The work carried out by S.I.Vavilov, by his successors and students made it possible to determine the general rules governing the phenomena of luminescence both in the liquid and solid phase. At present, the development of both vacuum- and radio engineering favors the investigation of the kinetics and energy conditions of the processes of luminescence caused by corpuscular excitation. It is possible to carry out investigations of luminescence caused by particles with different energies. This includes cathode- and scintillation luminescence. In these investigations, particles are concerned which show energies of from hundred thousands up to several million electron-Volts. At present, the luminescence of crystals under the

Card 1/4

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929710(

New Trends in the Investigation of Luminescence and the Development of Its Applications SOV/30-58-7-4/49

direct action of an intense electric field is usually called electric luminescence which was discovered for the first time by both the Soviet physicist O.V.Losev and the German physicist P.Pol. The duration of the state of excitation and of the luminescence of the molecules fluctuated from 10^{-10} seconds up to several seconds, which can be measured for the time being with sufficient accuracy by means of new instruments. One of the most important problems of molecular luminescence is closely connected with the utilization of low temperatures and consists in the investigation of the transition of molecules in biradical state. The conference on molecular luminescence held in February of this year - besides the one on crystal phosphors which took place last year - showed the rapid increase and the development of the application of luminescence in widely different fields of national economy. The following examples are given: Admixtures of luminescent substance protect synthetic materials against the decomposing luminous effect and thus considerably prolong their life. A luminescence coating of sand grains makes it possible to observe the washing away of sand by water, which is of great importance for the construction of hydrotechnical

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plants. A considerable development is also found with the use of luminescent dyes for dyeing microscopic preparations. It is further found that the production of new types of phosphorescent stones has not yet been started and that the results obtained theoretically in the field of luminescence are insufficiently exploited by the industry of the USSR. The Laboratory of Luminescence at the Physics Institute imeni P.N.Lebedev is not in a position to meet all requirements. It is time to build a special Institute of Luminescence within the system of AS USSR.

AUTHORS: Levshin, V. L., Baranova, Ye. G. SOV/48-22-9-7/40

TITLE: Various Kinds of Concentration Extinguishing and the Possibility of Their Classification (Razlichnyye vidy kontsentratsionnogo tusheniya i vozmozhnost' ikh razdeleniya)

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1958, Vol 22, Nr 9, pp 1038 - 1042 (USSR)

ABSTRACT: This is the short abstract of a lecture which to its whole extent is published in the periodical "Optika i spektroskopiya", 1958. The present paper is the continuation of the investigations (Refs 1,2) that are carried out to explain the nature of the concentration extinguishing of dye solutions. The rhodamine solutions 6 Zh and 3 B in water and ethyl alcohol were chosen as test samples. The authors regard the following 3 kinds of concentration extinguishing to be principally possible: 1) By inactive absorption of the exciting light by nonluminescing associates; 2) by transfer of the excitation energy from the excited monomer to the nonluminescing associates by means of induction; 3) by transfer

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of the energy from the excited monomer to the non-excited one. In the latter case the decrease in yield is caused by the fact that a part of the transitions leads to a dispersion of the excitation energy. The authors observed the formation of nonluminescing associates at higher concentrations and determined their number. Furthermore a scheme for the classification of the mentioned processes of extinguishing was worked out. In aqueous solutions of rhodamine 6 Zh and 3 B practically no association is found unto concentrations of 4.10^{-6} Mol l^{-1}. The investigation of the luminosity I_1 of thin layers of dye solutions yielded the data listed in table 1. The solubility of the dyes in alcohol is considerably higher than in water. In this case concentrations of $1,6.10^{-1}$ Mol l^{-1} may occur. In aqueous solutions they cannot surmount $3.10^{-3} \div 10^{-2}$ Mol l^{-1}. It seems to be probable that the migration extinguishing in the transmission of energy from one monomer to the other one is more efficient in water than in alcohol. The possibility of the formation of complicated associates

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from the molecules of two different dyes - rhodamine 6 Zh and 3B -was investigated. The different spectra prove the formation of complicated associates. The latter ones are less stable than the associates of single components; they disintegrate when the solutions are heated to 80°. At this temperature the observed spectrum of the binary solution agrees with the calculated one. In the association the change of the absorption spectra is restricted to the first absorption band in the visible part of the spectrum. The ultraviolet range of the spectrum in the case of simple as well as of complicated associates agrees with the spectrum of the non-associated molecules and is very similar for both dyes. Thus the association only modifies the cloud of the π-electrons. The authors acknowledge the assistance of L.V.Krotova . There are 2 figures, 2 tables, and 2 references, 2 of which are Soviet.

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ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute imeni P. N. Lebedev, AS USSR)

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LEVSHIN, V. L.

53-1-3/8

AUTHOR: Levshin, V. L.

TITLE: The Study of the Phenomena of Luminescence and the Development of Their Applications in the Soviet Union (Izucheniye yavleniy lyuminestsentsii i razvitiye yeye primeneniy v Sovetskom Soyuze)

PERIODICAL: Uspekhi Fizicheskikh Nauk, 1958, Vol. 64, Nr 1, pp. 55-92 (USSR)

ABSTRACT: This short work of course cannot give a complete idea of the development of the theory on luminescence in the Soviet Union, for more than 3000 Sovietic papers exist on this field. Therefore the author restricts himself on the examination of the central problems, which were raised and solved by the Sovietic scientists. In this case many important investigations, especially on the chemistry of luminiphors and also some theoretical works, must remain neglected. Also the development of the applications of luminescence is discussed very shortly. This survey is arranged as follows: The yield of luminescence, the processes in case of extinction of the luminescence; the

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phenomena on occasion of the transmission of the excitation energy; the polarization of the luminescence; the duration of the luminescence and the laws of attenuation; the apparatus for the examination of the phenomena of luminescence, the spectroscopic investigation and the spectral laws; the crystal phosphorescent substances; the levels of the localisation of the charges; the probabilities of recombination and localisation of electrons; the optical and thermal electrons; the centers of luminescence the non-linear effects of the luminescence of crystal phosphorescent substances, the luminescence in case of the corpuscular stimulation and the electroluminescence. Finally the author makes a short report on some applications of the luminescence: Here especially the applications in qualitative and quantitative analysis are to be mentioned. Very numerous, too, are the applications of the luminescence in biology and medicine, by this means, i. g. has been studied the migration of the energy in an albumin molecule. Further luminescent materials are used for colour separation in cartography and as inhibitors for the weakening of photochemical effects. Also the